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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,423	09/26/2003	John George Aschoff	SJO920030019US1	8426

46917 7590 09/11/2008
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EXAMINER

TSAI, SHENG JEN

ART UNIT	PAPER NUMBER
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2186

MAIL DATE	DELIVERY MODE
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09/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/672,423	Applicant(s) ASCHOFF ET AL.	
	Examiner SHENG-JEN TSAI	Art Unit 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9-19,21-31 and 33-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-19,21-31 and 33-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/21/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is taken in response to Applicant's Request for Continued Examination (RCE) filed on July 21, 2008 regarding application 10/672,423 filed on September 26, 2003.

2. Claims 1, 13, 25, 37 and 39-40 have been amended.

Claims 8, 20, 32 and 41-43 have been cancelled.

Claims 1-7, 9-19, 21-31 and 33-40 are pending for consideration.

3. ***Response to Amendments and Remarks***

Applicant's amendments and remarks have been fully and carefully considered, with the Examiner's response set forth below.

(1) Applicants amend independent claims 1, 13, 25, 37 and 39-40 with the additional limitation of "wherein the processor is configured for determining workload requirements of the user by automatically creating workload requirements based on observation of storage access patterns of a user."

In response, a new ground of claim analysis based on the previously cited references has been embarked. Refer to the corresponding sections of the claim analysis for details.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7, 9, 12-19, 21, 24-33, and 36-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zahavi (US 6,820,035).

As to claim 1, Zahavi discloses **an administration device for providing automatic performance optimization of virtualized storage allocation within a network of storage elements** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (abstract); figure 1], **comprising: memory for storing data thereon** [figure 1 shows a system memory (114) and a plurality of storage devices (115, 116) for storing data]; **and a processor** [the COMPUTER SYSTEM, figure 1, 113; In another embodiment, a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, lines 66-67; column 3, lines 1-4)] **configured for receiving from a user a request for storage of data** [the user may request the type of disk drives (figure 6, step 184), the type of protection (figure 6, 186) for storage of data], **for determining workload requirements of the user making the request** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention

Art Unit: 2186

relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28)], **for analyzing system parameters including performance characteristics** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28)] **of storage volumes within the network** [figure 1 shows the network (112) of a plurality of storage volumes (115, 116); figure 21, 614 shows the storage environment may be a SAN (Storage Area Network); figures 13-14, 21 and 23-27 illustrate analyzing system parameters and performance characteristics] **and for providing storage to meet the workload requirements of the user determined by the processor** [figure 10, step 224 shows the processor calculates workload requirements based on user provided request (steps 220 and 222); Determining the size and number of disk array or other data storage system needed by a customer requires information about both space, traffic and a desired quality of service. It is not sufficient to size a solution simply based on the perceived quantity of capacity desired, such as the number of terabytes believed to be adequate (column 1, lines 66-67; column 2, lines 1-4); The invention uses such information to advise a user on how to

Art Unit: 2186

configure data storage systems having good capabilities to meet his needs, and while also considering traffic, other workload characteristics, and user defined Performance Zone Values. The invention allows for the integration of space and traffic needs of a business along with performance goals such that the resulting configuration can handle the workload in a manner that meets a desired quality of service (column 7, lines 33-40); In another embodiment, a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, lines 66-67; column 3, lines 1-4)] **and to meet competing workload requirements based on the analysis of the system parameters** [a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, 60-65); ANALYZER API (figure 21, 600); ANALYZER ARCHIVES (figure 21, 602); the analysis correlates all the selected devices according to system parameters (i.e., a matrix of coefficients) (figure 28, 838); a “profile” of system parameters is generated by using a modeling tool (figure 29, 844); column 10, lines 32-48], **wherein the processor is configured for determining workload requirements of the user by automatically creating workload requirements based on observations of storage access patterns of a user** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a

Art Unit: 2186

Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28); specifically, this invention is directed to a configuration method and system for storage capacity planning based on user or administrator defined workload requirements (abstract); figure 13, 524 shows an user interface that allows a user to define workload requirement; figure 14; In step 842, the interface provides the ability to display the activity patterns of each affinity group so that the validity of the selection can be visualized. Then in step 844, a profile is generated for each affinity group to be used in a modeling tool. The profile may comprise 6 specific pieces of information: % Random Read Hit, % Random Read Miss, % Sequential Read, % Write, Average Read size, and Average Write Size. Connecting step B of FIG. 29 logically flows into identically labeled step A of FIG. 30 (column 14, lines 32-41)].

Regarding claim 1, Zahavi teaches that the processor is configured for determining workload requirements of the user by creating workload requirements based on observation of storage access patterns of a user, but does not teach that the processor creates the workload requirement automatically.

However, automating activities that was used to be perfumed manually does not make it patentable according to **MPEP 2144.04 III**, as shown below:

III. AUTOMATING A MANUAL ACTIVITY

In re Venner, 262 F.2d 91, 95, 120 USPQ 193, 194 (CCPA 1958) (Appellant argued that claims to a permanent mold casting apparatus for molding trunk pistons were allowable over the prior art because the claimed invention combined “old permanent-mold structures together with a timer and solenoid which automatically actuates the known pressure valve system to release the inner core after a predetermined time has elapsed.” The court held that broadly providing an automatic or mechanical means to replace a manual activity which accomplished the same result is not sufficient to distinguish over the prior art.).

Thus, it has been ruled that providing an automatic means to replace a manual activity which accomplished the same result is not sufficient to distinguish over the prior art, hence is obvious and not patentable.

As to claim 2, Zahavi teaches that **the processor provides storage to meet the workload requirements based on the workload requirements of the user and storage requirements for the data** [a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, 60-65); ANALYZER API (figure 21, 600); ANALYZER ARCHIVES (figure 21, 602); the analysis correlates all the selected devices according to system parameters (i.e., a matrix of coefficients) (figure 28, 838); a “profile” of system parameters is generated by using a modeling tool (figure 29, 844); column 10, lines 32-48].

As to claim 3, Zahavi teaches that **the processor provides storage to meet the workload requirements by selecting storage locations that meet performance**

Art Unit: 2186

and space requirements of the request [these results take into consideration the performance constraints of the various components of the Symmetrix within each family, calculate the number of components requires and determine the architecture of each preferred Symmetrix model and build the required number of machines for the prescribed workload. In addition, the user is able to modify the count of ports and directors in order to accommodate other needs such as redundancy, future growth or to account for uneven distribution of work, wherein the Logic compensates by calculating a totally balanced system. The number of back-end directors is calculated based on the number of required disks. There are physical limits to the number of disks that a back-end port can accommodate, depending on the preferred Symmetrix model. Sizing here is based on the maximum number of disks allowed per port (column 10, lines 32-48); storage space adjusted (figure 7, 198); figure 10].

As to claim 4, Zahavi teaches that **the processor selects storage locations that meet the performance and space requirements through analysis of the request for storage** [a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, 60-65); ANALYZER API (figure 21, 600); ANALYZER ARCHIVES (figure 21, 602); the analysis correlates all the selected devices according to system parameters (i.e., a matrix of coefficients) (figure 28, 838); a “profile” of system parameters is generated by using a

Art Unit: 2186

modeling tool (figure 29, 844); column 10, lines 32-48; storage space adjusted (figure 7, 198); figure 10].

As to claim 5, Zahavi teaches that **the processor selects storage locations that meet the performance and space requirements through a storage policy mechanism** [a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, 60-65); ANALYZER API (figure 21, 600); ANALYZER ARCHIVES (figure 21, 602); the analysis correlates all the selected devices according to system parameters (i.e., a matrix of coefficients) (figure 28, 838); a “profile” of system parameters is generated by using a modeling tool (figure 29, 844); column 10, lines 32-48; storage policy mechanism includes “type of disk drives” (figure 6, 184), “type of protection (e.g., RAID-1, RAID-S, unprotected)” (figure 6, 186)].

As to claim 6, Zahavi teaches that **the processor determines workload attributes of the user** [specifically, this invention is directed to a configuration method and system for storage capacity planning based on user or administrator defined workload requirements (abstract); figure 13, 524 shows a user interface that allows a user to define workload requirement; figure 14] **and desired levels of performance** [adjustable performance comfort zone value (figure 6, 188); PERFORMANCE ZONE (figures 15-16)] , **retains the latest information about the available capacity within the network of storage elements** [configure storage network, figure 12; configure

Art Unit: 2186

other data storage systems , figure 11], **determines performance characteristics of individual storage devices at different locations within the network as a function of the workload requirements of the user** [figures 6-21], **and determines a presence and attributes of competing workloads sharing the storage devices over extended periods of time** [figures 22-27].

As to claim 7, Zahavi teaches that **the processor is configured for determining workload requirements of the user** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28)] **by using canned workload descriptions that are based on characterizations of user environments across various industries and applications** [figure 13, 524 shows a user interface that allows a user to define workload requirement; figure 14; “type of disk drives” (figure 6, 184), “type of protection (e.g., RAID-1, RAID-S, unprotected)” (figure 6, 186)].

As to claim 9, Zahavi teaches that **the processor is configured for determining workload requirements of the user** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and

Art Unit: 2186

method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28)] **by using intelligent software components that analyze workload descriptions for an application of the user** [a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, 60-65); ANALYZER API (figure 21, 600); ANALYZER ARCHIVES (figure 21, 602); the analysis correlates all the selected devices according to system parameters (i.e., a matrix of coefficients) (figure 28, 838)].

As to claim 12, Zahavi teaches that **the processor is configured for performing a calibration process to discover the performance capabilities of the underlying storage devices** [figure 3 shows the performance degradation factor; figures 5-9 show the process of adjusting storage allocation based on the type of disks and their characteristics].

As to claim 13, Zahavi discloses **a network storage system** [FIG. 1 is a block diagram of a data storage network for which Logic (FIG. 2) that is part of the computer system shown in FIG. 1 is particularly useful (column 13, lines 11-13)], **comprising:**
a plurality of storage devices [figure 1 shows a plurality of storage devices (115 and 116)];
a plurality of servers [figure 1 shows a service processor (123); in addition, remote systems (111), which have their own respective service processor, are to be configured

Art Unit: 2186

into the system as well, resulting a plurality of service processors] **coupled to the plurality-of storage devices** [figure 1], **via network interconnect** [remote systems connected via network]; **and**

an administration device, coupled to at least the plurality of storage devices, for providing automatic performance optimization of virtualized storage allocation within a network of storage elements, wherein the administration device further comprises: memory for storing data thereon [refer to “As to claim 1” through “As to claim 9”]; **and**

a processor [the COMPUTER SYSTEM, figure 1, 113; In another embodiment, a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, lines 66-67; column 3, lines 1-4)] **configured for receiving from a user a request for storage of data** [the user may request the type of disk drives (figure 6, step 184), the type of protection (figure 6, 186) for storage of data], **for determining workload requirements of the user making the request** [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28)], **for analyzing system**

Art Unit: 2186

parameters including performance characteristics [System and Method for Determining Workload Characteristics for One or More Applications Operating in a Data Storage Environment (title); this invention relates generally to managing and analyzing data in a data storage environment, and more particularly to a system and method for determining workload characteristics including the profiles for such characteristics for one or more applications operating in a data storage environment (column 1, lines 23-28)] **of storage volumes within the network** [figure 1 shows the network (112) of a plurality of storage volumes (115, 116); figure 21, 614 shows the storage environment may be a SAN (Storage Area Network); figures 13-14, 21 and 23-27 illustrate analyzing system parameters and performance characteristics] **and for providing storage to meet the workload requirements of the user determined by the processor** [figure 10, step 224 shows the processor calculates workload requirements based on user provided request (steps 220 and 222); Determining the size and number of disk array or other data storage system needed by a customer requires information about both space, traffic and a desired quality of service. It is not sufficient to size a solution simply based on the perceived quantity of capacity desired, such as the number of terabytes believed to be adequate (column 1, lines 66-67; column 2, lines 1-4); The invention uses such information to advise a user on how to configure data storage systems having good capabilities to meet his needs, and while also considering traffic, other workload characteristics, and user defined Performance Zone Values. The invention allows for the integration of space and traffic needs of a business along with performance goals such that the resulting configuration can handle

Art Unit: 2186

the workload in a manner that meets a desired quality of service (column 7, lines 33-40); In another embodiment, a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, lines 66-67; column 3, lines 1-4)] **and to meet competing workload requirements based on the analysis of the system parameters** [a program product includes a computer-readable medium having code included on the medium configured to carry out computer-executed steps of analyzing work-related data for creating a correlation of logical devices and then using the correlation to perform a storage management function (column 2, 60-65); ANALYZER API (figure 21, 600); ANALYZER ARCHIVES (figure 21, 602); the analysis correlates all the selected devices according to system parameters (i.e., a matrix of coefficients) (figure 28, 838); a “profile” of system parameters is generated by using a modeling tool (figure 29, 844); column 10, lines 32-48].

As to claim 14, refer to “As to claim 2.”

As to claim 15, refer to “As to claim 3.”

As to claim 16, refer to “As to claim 4.”

As to claim 17, refer to “As to claim 5.”

As to claim 18, refer to “As to claim 6.”

As to claim 19, refer to “As to claim 7.”

As to claim 21, refer to “As to claim 9.”

Art Unit: 2186

As to claim 24, refer to "As to claim 12."

As to claim 25, refer to "As to claim 1."

As to claim 26, refer to "As to claim 2."

As to claim 27, refer to "As to claim 3."

As to claim 28, refer to "As to claim 4."

As to claim 29, refer to "As to claim 5."

As to claim 30, refer to "As to claim 6."

As to claim 31, refer to "As to claim 7."

As to claim 33, refer to "As to claim 9."

As to claim 36, refer to "As to claim 12."

As to claim 37, refer to "As to claim 1."

As to claim 38, refer to "As to claim 6."

As to claim 39, refer to "As to claim 1."

As to claim 40, refer to "As to claim 1."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 10-11, 22-23, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zahavi (US 6,820,035), and in view of Lee et al. (US Patent Application Publication 2003/0120864).

Art Unit: 2186

As to claim 10, Zahavi does not explicitly mention that **the processor is configured for accessing a virtualization engine and volume managers to stripe data within a virtual disk across managed storage devices.**

However, the apparatus disclosed by Zahavi is a generic storage network system that is directly applicable to support storage virtualization.

Further, Lee et al. teach in their invention “High-Performance Log-Structured RAID” a method and apparatus of improving the performance of a RAID system under particular workload condition [paragraph 0007] for supporting storage virtualization [abstract; paragraph 0002] in which stripes of data are distributed among a plurality of disks [figure 2; paragraph 0096].

Storage virtualization allows dynamic allocation of data based on the availability of each storage device in the system, which results in better utilization of the capacity of the storage devices. Stripe of data across storage devices provides redundancy and allows data to be recovered upon failures, hence improves the reliability of the system.

Therefore, it would have been obvious for one of ordinary skills in the art to recognize the benefits of employing storage virtualization and data striping, as demonstrated by Lee et al., and to incorporate it into the existing apparatus disclosed by Zahavi to fully utilize the capacity of the storage devices and to improve the reliability of the system.

As to claim 11, Lee et al. teach that **the processor is configured for determining how to relocate virtual disks to meet a desired level of performance**

Art Unit: 2186

[stripes of data are distributed among a plurality of disks (figure 2; paragraph 0096) to improve reliability of the storage system].

As to claim 22, refer to "As to claim 10."

As to claim 23, refer to "As to claim 11."

As to claim 34, refer to "As to claim 10."

As to claim 35, refer to "As to claim 11."

8. *Related Prior Art of Record*

The following list of prior art is considered to be pertinent to applicant's invention, but not relied upon for claim analysis conducted above.

- Arnold et al., (US Patent Application Publication 2004/0243692), "Policy-Based, Automatically Allocated Storage."
- Eshel et al., (US 5,940,840), "Phantom Files for Dynamic Read Bandwidth Measurements of Computer Disks."
- Quernemoen et al., (US 6,654,756), "Combination of Mass Storage Sizer, Comparator, OLTP User Defined Workload Sizer, and Design."

Conclusion

9. Claims 1-7, 9-19, 21-31 and 33-40 are rejected as explained above.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheng-Jen Tsai whose telephone number is 571-272-4244. The examiner can normally be reached on 8:30 - 5:00.

Art Unit: 2186

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sheng-Jen Tsai/

TFSA Examiner, Art Unit 2186

September 9, 2008